

**Appl. No.** : **09/871,571**  
**Filed** : **May 30, 2001**

### **AMENDMENTS TO THE DRAWINGS**

The attached sheets of drawings include changes to Figures 1 and 8-14. The sheet, which includes Figures 1-2, replaces the original sheet including Figures 1-2. Each of the sheets, which includes Figures 8-14, respectively, replaces the original sheets including Figures 8-14, respectively. In Figure 1, reference numerals have been added for the elements that are shown on the original drawing. In Figures 8-14, element names, which are described in the original specification but not shown on the drawings, have been added. Furthermore, Applicant submits herewith a set of formal drawings including Figures 3-7. Thus, the drawing amendments are merely made to conform them to U.S. patent practice.

Attachment: Replacement sheets

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## **REMARKS**

In response to the Office Action mailed December 21, 2004, Applicant has amended the application as above. No new matter is added by the amendments as discussed below. Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the amendments and the remarks set forth below.

### **Discussion of Specification and Drawing Amendments**

The specification and drawings have been amended to adopt the Examiner's suggestions or to conform to U.S. practice. Thus, the drawing and specification amendments do not introduce any new matter to the application. Applicant respectfully requests the entry of the amendments.

### **Discussion of Claim Amendments**

Claims 1-4, 18-19, 22-25, 31-33, 40-43 and 47-50 have been cancelled. Claims 5, 20, 26, 30, 34, 37, 39, 44, and 46 have been amended. Claims 5-17, 20-21, 26-30, 34-39, and 44-46 are pending in this application. The amendments to the claims are merely for clarification or to rewrite the claims in independent form, and do not narrow the scope of protection. Furthermore, no new matter is added by the amendments. Applicant respectfully requests the entry of the amendments.

### **Discussion of Specification Objections**

The Examiner objected to the specification because the abstract contains the legal phraseology "said." In reply, the term "said" has been replaced with "the."

The Examiner also objected to the specification because the status of the related applications (09/505,228 and 09/613,181) need to be updated to U.S. Patents Nos. 6,760,300 and 6,591,284, respectively. In reply, the related application numbers have been updated to the corresponding patent numbers.

The Examiner objected to the specification because it fails to include reference numbers and detailed description of the invention shown for Figs. 1-2 and 14. In reply, Applicant has provided reference numerals (25 and 35) to Figure 1.

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With regard to Figure 2, Applicant respectfully submits that the specification includes the following description for the drawing, and reference numerals need not be provided:

[0027] FIG. 2 shows situation wherein the invented channel estimation outperforms classical approaches because it still provides an optimal estimate although no sufficient references tones (full line) are available to cover all carriers (dashed line) of the channel to be estimated.

[0069] When using Pilot Symbol Assisted Modulation, a comb spectrum (FIG. 2) has to be measured, and only the teeth of this comb are used for the FFTs. This particular case has been studied by [S. He and M. Torkelson, Computing Partial DFT for Comb Spectrum Evaluation, IEEE, 1996, Vol. 3, no. 6, June, p 173-175]. In this case, the DFT can be computed with  $N_c/4 + N_{he}/2 + \log_2 N_{he} - N_{he}$  complex multiplications, which represents a large gain for a large number of carriers. FIGS. 3 and 4 show complexity evaluations of the different approaches: the SVD-based approach of [O. Edfors, M. Sandell, J. J. van de Beek, S. K. Wilson, and P. O. Borjesson. "OFDM Channel Estimation by Singular Value Decomposition," IEEE Trans. on Communications, 46(7):931-939, July 1998.] and the frequency-time approaches according to the invention with plain FFTs, with FFT pruning and with FFT optimized for a comb spectrum.

With regard to Figure 14, Applicant respectfully submits that the specification includes the following description with reference numerals for the drawing:

[0036] FIG. 14 shows a transmitting peer (1000) with at least one transmitting device (two shown) and a receiving peer (1010) with at least one receiving device or receiver (two shown). The channel estimation within said receiver tries to characterize the channel (1020) in between the transmitting device and the receiving device.

In view of the above, withdrawal of the objections is respectfully requested.

#### **Discussion of Claim Objections**

The Examiner objected to Claims 37, 39, 41, 43 and 46 because the claims contain the phrase "capable of." As discussed above, Claims 41 and 43 have been cancelled. In reply,

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Applicant has replaced the term “capable of” in Claims 37, 39 and 46 with “configured to.”  
Withdrawal of the objections is respectfully requested.

**Rejection of Claim under 35 U.S.C. § 112, ¶ 2**

The Examiner has rejected Claims 1, 7, 19, 22, 31, 33 and 48 under 35 U.S.C. § 112, second paragraph as being indefinite. As discussed above, Claims 1, 19, 22, 31, 33 and 48 have been cancelled. The Examiner asserts that Claim 7 recites the terms “the columns” in line 1, “the row” in line 2, “the non-zero time samples” and “the impulse response” and there is insufficient antecedent basis for the terms. With regard to the term “the non-zero time samples,” Applicant respectfully submits that the term is an inherent feature of the channel impulse response, and thus the term is definite. With regard to the terms “the columns” and “the row,” Applicant respectfully submits that the terms are inherent features of the IFFT matrix, and thus the terms are definite. With regard to the term “the impulse response,” Applicant respectfully submits that the term is an inherent feature of the channel, and thus the term is definite. In view of the above, withdrawal of the rejections is respectfully requested.

**Patentability of Pending Claims**

The Examiner has rejected Claims 1-4, 32, 22-25, 31, 33, 47 and 48-50 under 35 U.S.C. § 103(a) as being unpatentable over H'mimy (U.S. Patent No. 5,912,876) in view of Mesiwala (U.S. Patent No. 6,097,776). The Examiner has also rejected Claims 18-19 and 40-43 under 35 U.S.C. § 103(a) as being unpatentable over H'mimy in view of Mesiwala and further in view of Jones (U.S. Patent No. 6,487,253). Applicant respectfully submits that Claims 1-50 are allowable over the prior art of record. However, in order to expedite the prosecution of the application, Applicant cancelled all rejected claims.

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In view of Applicant's amendments to the application and the foregoing remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: \_\_\_\_\_

4/20/05

By: \_\_\_\_\_

John M. Carson  
Registration No. 34,303  
Attorney of Record  
Customer No. 20,995  
(619) 235-8550

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